

LARVAL HISTORY OF THE SPIDER CRAB, *SCHIZOPHRYNS ASPERA* (H. MILNE-EDWARDS) (BRACHYURA, MAJIDAE) AS OBSERVED IN THE LABORATORY¹

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(With four text-figures)

The present paper deals with the larval history of the spider crab, *Schizophrys aspera* (H. Milne-Edwards) as observed in the laboratory. The metamorphosis comprises 2 zoeal and a megalopa stage at sea water temperature ranging from 26°C to 27.5°C and salinity about 33 ppt. During the experiment the larvae were fed with freshly hatched *Artemia* nauplii. All larval stages have been figured and described in detail.

INTRODUCTION

Though larvae of many species of spider crabs have been known since Rathke's (1840) first description of the zoeae of *Hyas araneus* (Yang 1968), no work has been done in the genus *Schizophrys* but for the description of the larvae of a species given by Kurata (1969) as of *S. aspera*.

Except for the laboratory reared larvae of 3 species of the family Majidae, no other spider crab has been reared from the Indian waters. The 3 laboratory reared spider crabs being, *Dehaanius limbatus*, (Kakati & Sankolli 1975b), *Acheus lacertosus* (Kakati & Sankolli 1975) and *Doclea hybrida* (Sankolli & Shenoy 1975). Therefore, the larvae of *Schizophrys aspera*, one of the 3 species of the genus from Indo-west Pacific region (Se-

renc 1968) were reared in the laboratory. The other two species of the genus represented in the region are *S. dama* (Herbst) and *S. hilen-sis* Rathbun.

The present account deals with the 2 zoeae and a megalopa of *S. aspera* and compares the larvae with those of Kurata's larvae of *S. aspera*.

MATERIAL AND METHODS

An ovigerous female of *Schizophrys aspera* was collected from Ankola rocky shore, west coast of India, on 12th December 1973 and the crab was kept alive in a plastic container until the larvae hatched on 14th December 1973. The rearing method adapted for the experiment was same as described by Kakati & Sankolli (1975).

During the course of the experiment the temperature of the sea water ranged from 26 to 27.5°C and salinity about 33 ppt. Freshly hatched *Artemia* nauplii were used as food for the crab larvae. The shortest period for complete larval development was 8 days.

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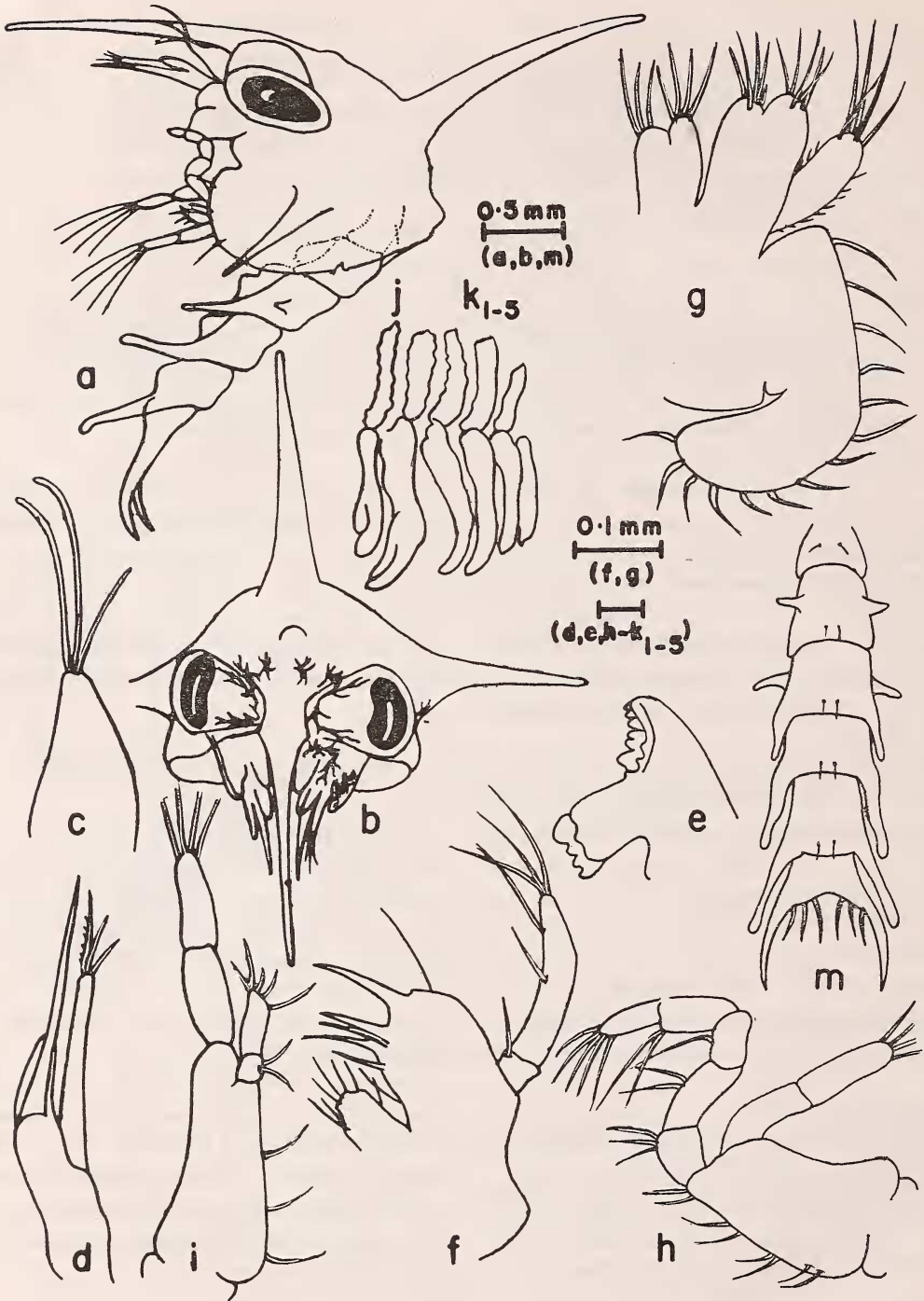


Fig. 1. First zoea of *Schizophrys aspera* (H. Milne-Edwards): a. lateral view of zoea; b. front view of zoea; c. antennule; d. antenna; e. mandible; f. first maxilla; g. second maxilla; h. first maxilliped; i. second maxilliped; j. third maxilliped; k₁₋₅, pereopods; m. abdomen.

FIRST ZOEAE
(Fig. 1)

Rostral spine: 0.90 mm;
Lateral spine: 0.66 mm;
Dorsal spine: 1.03 mm;
Abdomen length: 1.70 mm.
Duration of the stage: 3-4 days.

Carapace smooth, with all three spines; dorsal spine slightly curved backwards; lateral spines more or less straight; the tips of all spines rounded; 3 setae present along the anterolateral border of carapace; prominent mediodorsal and medio-frontal tubercles present.

Antennule (Fig. 1,c): Conical, with 3 unequal aesthetascs. *Antenna* (Fig. 1,d): Spinous process with 2 rows of 10 - 11 spines; exopod with 3 unequal spines which in turn have spinules; endopod bud well developed. *Mandible* (Fig. 1,e): With strongly developed molar and incisor processes and without palp. *First maxilla* (Fig. 1,f): Coxal and basal endites each with 7 setae; palp 2-segmented with a single seta on proximal and 5 setae on distal segments. *Second maxilla* (Fig. 1,g): Both bilobed coxal and basal endites with 3 + 4 and 5 + 5 setae on their lobes; palp unsegmented and with 5 setae terminally, its free margins with minute hairs; scaphognathite with 14 finely plumose setae. *First maxilliped* (Fig. 1,h): Basipod with 8 setae; endopod 5-segmented with 3, 2, 1, 2 and 5 setae arranged distalwards; exopod 2-segmented with 4 natatory setae on its distal segment. *Second maxilliped* (Fig. 1,i): Basipod with 3 setae; endopod 2-segmented with 2 and 5 setae on proximal and distal segments respectively; exopod similar to that of first maxilliped. *Other appendages* (Fig. 1,j & k1-5): Third maxilliped and pereopods in bud form, the 3rd maxilliped and 1st pereopod showing biramous and chelate nature respectively; gill buds well developed. *Abdomen*

(Fig. 1,m): 5-segmented plus telson, lateral protuberance on 2nd and 3rd segments as illustrated; the postero-lateral sides of segments 3 - 5 produced to form spines with rounded tips, and they increase in length posteriorly; a pair of setae present on all segments. *Telson* (Fig. 1,m): Telson fork wide; cornua smooth; process formula 3 + 3.

Chromatophores: To the naked eye, larvae look reddish brown. Eyestalks reddish-yellow with brownish reticulate chromatophores along their front margins. Carapace spines devoid of chromatophores. All abdominal segments except for telson are crimson red in colour with brownish red branched chromatophores. Basipods of 1st and 2nd maxillipeds reddish in colour with brown reticulate chromatophores. Whole front area is yellowish brown in colour. Other chromatophores are as illustrated and are brownish red in colour. This pattern remains the same for both the zoeal stages.

SECOND ZOEAE
(Fig. 2)

Rostral spine: 1.05 mm;
Lateral spine: 0.75 mm;
Dorsal spine: 1.07 mm;
Abdomen length: 2.12 mm.
Duration of the stage: 3 - 4 days.

This stage is characterised by: carapace along its antero-lateral margin carries 5 setae, eyes stalked, mandible with palp bud, maxillipeds with 6 natatory setae, 6th abdominal segment separated from telson.

Antennule (Fig. 2,c): Now with 7 aesthetascs and a seta, with endopod bud near its distal end. *Antenna* (Fig. 2,d): Endopod much elongated extending to about 2/3 of the spinous process. *Mandible* (Fig. 2,e): Now with palp bud. *First maxilla* (Fig. 2,f): Coxal endite with 7 setae and basal with 9; palp 2-

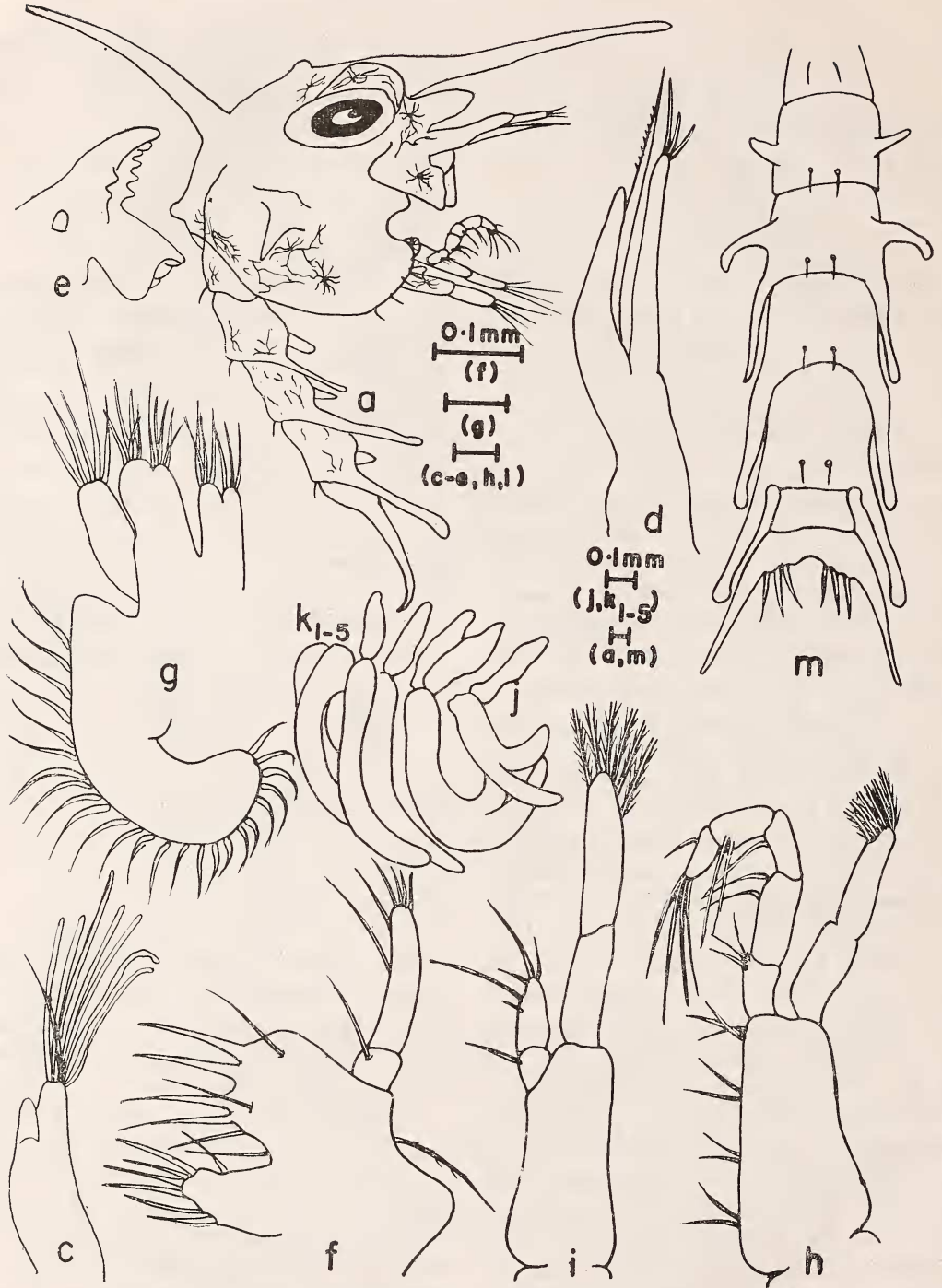


Fig. 2. Second zoea of *Schizophrys aspera* (H. Milne-Edwards): a. lateral view of zoea; c. antennule; d. antenna; e. mandible; f. first maxilla; g. second maxilla; h. first maxilliped; i. second maxilliped; j. third maxilliped; k_{1-5} . pereiopods; m. abdomen.

segmented with 1 and 6 setae on its proximal and distal segments. *Second maxilla* (Fig. 2,g): Both bilobed coxal and basal endites with 3 + 4 and 5 + 5 setae on their lobes; palp with 5 setae; scaphognathite fringed with 25 marginal setae. *First maxilliped* (Fig. 2,h): Except for the increase in number of natatory setae to 6 no other change. *Second maxilliped* (Fig. 2,i): Exopod as in first maxilliped; no other change. *Other appendages* (Fig. 2,j, k1-5): More elongated than in previous stage. *Abdomen* (Fig. 2,m): 6th abdominal segment separated from telson; no other change; *Telson* (Fig. 2,m): No change.

MEGALOPA
(Figs. 3 & 4)

Carapace length: 1.26 mm; Carapace breadth: 1.03 mm. Duration of the stage: 5 days (none moulting to crab instar).

The carapace is quadrangular, length being slightly more than its breadth, covered with spines and setae, 2 pairs of spines on each side of the gastric region, a central spine in the gastric region; 2 spines in cardiac and a spine in intestinal region, hepatic lobes slightly conical, the rostrum bifid though the centre is conical, a single seta springs at subterminal level of rostral horns, eyes with a pair of setae antero-dorsally.

Antennule (Fig. 3,c): Peduncle 3-segmented, each segment with a single seta, inner flagellum unsegmented and with 2 terminal and 2 subterminal setae, dorsal flagellum 3-segmented, proximal with 1 seta, middle with 6 aesthetascs and distal with 4 aesthetascs basally and a seta terminally. *Antenna* (Fig. 3,d): Peduncle 3-segmented, basal segment with its distal tips forming lobes. The following segments with a seta and 3rd segment with 3 setae, flagellum 4-segmented, proximal

2 segments bare, last two segments distally each with 3 setae. *Mandible* (Fig. 3,e): Masticatory process rounded, palp 3-segmented with 4 stiff setae on the distal segment. *First maxilla* (Fig. 3,f): Coxal endite with 9 setae and basal with 17; palp unsegmented, with 2 short terminal setae. *Second maxilla* (Fig. 3,g): The lobes of coxal endites each with 4 and basal each with 6 setae; endopod simple without any setae; scaphognathite fringed with 35-37 setae. *First maxilliped* (Fig. 3,h): Coxal endite with 8 setae and basal with 12; endopod unsegmented and bare; exopod 2-segmented with 1 and 4 setae terminally on proximal and distal segments respectively; epipod with 5 setobranch-like setae. *Second maxilliped* (Fig. 4,i): Endopod 5-segmented and with 0, 0, 1, 3 and 5 setae arranged distalwards; exopod 2-segmented and with 4 apical plumose setae on the distal segment. *Third maxilliped* (Fig. 4,j): Endopod 5-segmented and setation being, 10, 6, 4, 8 and 4 respectively on proximal to distal segments; exopod 2-segmented and with 4 setae at its tip; epipod with 8 basal setae and 8 setobranch-like setae on its ribbon-like structure, with an arthrobranch. *Pereiopods* (Fig. 4,k1-5): Cheliped on its dorsal side near the base of the palm with a tooth-like structure; setose exopodites of segments 2-5 with a tooth on inner side and a protuberance with a seta on outer side, and 4 stiff setae on the inner surface of each of the pereiopods 2-5. *Abdomen* (Figs. 3,a & 4,b): 6-segmented; 2nd and 3rd segments each with a pair of posteriorly directed lateral spines; setation being 2 on 1st and 4 on 2nd to 5th segments and 2 on 6th segment. *Telson* (Fig. 4,n): Rounded and its margin smooth, but on ventral side are 2 setae near uropods. *Pleopods* (Fig. 4,l₁-4,n): Exopods of pleopods 1-4 each with 10 setae while that of 5th (= uropod) with 5 setae; endopods each with

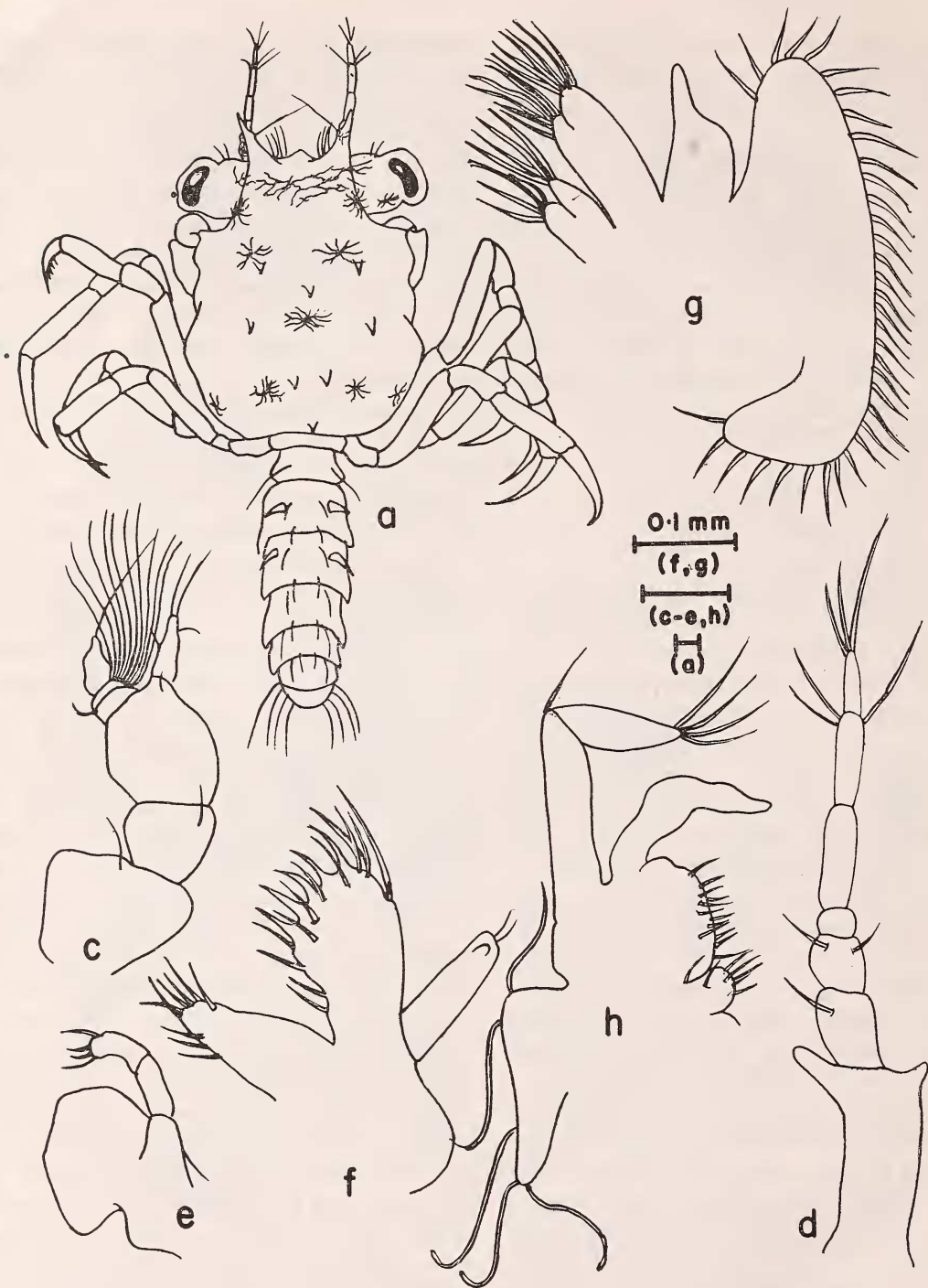


Fig. 3. Megalopa of *Schizophrys aspera* (H. Milne-Edwards): a. dorsal view of megalopa; c. antennule; d. antenna; e. mandible; f. first maxilla; g. second maxilla; h. first maxilliped.

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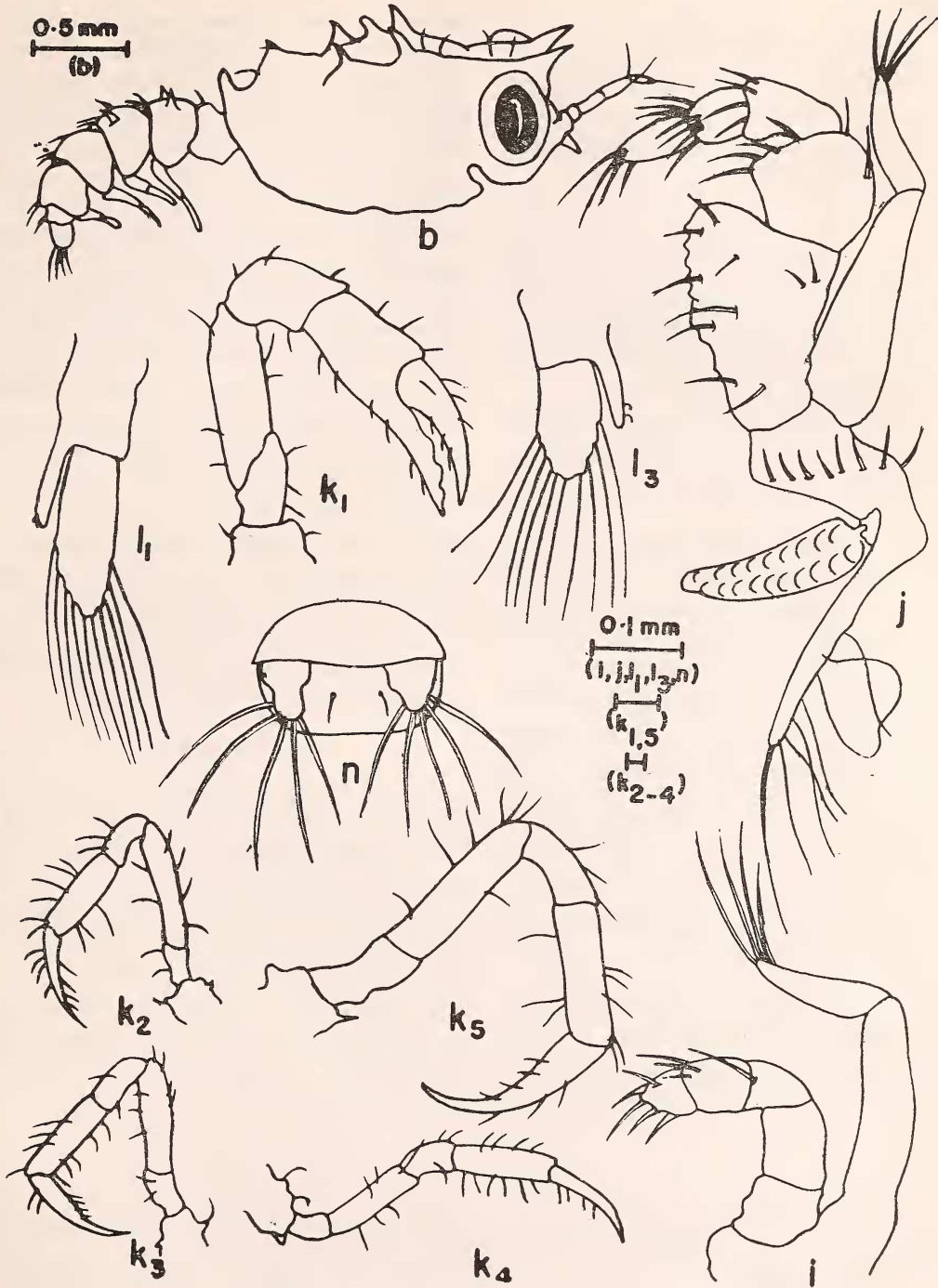


Fig. 4. Megalopa of *Schizophrys aspera* (H. Milne-Ewards): b. lateral view of megalopa; i. second maxilliped; j. third maxilliped; k₁. first pereopod (cheliped); k₂. second pereopod; k₃. third pereopod; k₄. fourth pereopod; k₅. fifth pereopod; l₁. first pleopod; l₃. third pleopod; n. telson + uropod.

2 hooks distally.

Chromatophores: General body colour is light yellowish-green; chromatophores are reticulate and are reddish brown in colour. All pereopod segments and pleopods with reddish brown chromatophores.

DISCUSSION

Like most of the other majid zoeae, the zoea of the present species is far advanced in development at hatching with well developed antennal endopod and pleopod buds.

The zoeae of the present species (Karwar specimen) differ from those of *Schizophrys aspera* described by Kurata (1969) in the following:

The larvae of the Karwar species have the carapace spines with rounded tips; lateral spines being comparatively longer than the other 2 carapace spines; the postero-lateral projection of the abdominal segments 3-5 increase in length posteriorward and with round tips; telson cornua devoid of spines; terminal and proximal segment of endopod of first maxilliped with 4 and 2 setae respectively whereas in the Kurata's larvae, carapace spines are pointed; lateral carapace spines smaller; abdominal projections decrease posteriorward and are pointed; telson cornua each with 3 spines; corresponding maxillipedal segments with 5 and 3 setae.

As far as the megalopa is concerned, in the Karwar specimen, the rostrum has 3 spines, the middle one being broadly triangular, lateral ones each with a seta; epibranchial pro-

cess of carapace absent; antennal flagellum apically with 3 setae; dorsal spines of 2nd and 3rd abdominal segments directed away from the mid-line whereas in the Kurata's megalopa, median rostral spine prominent; 2 setae each on each of the lateral rostral spines; epibranchial process present; antennal flagellum apically with 2 setae; dorsal spines of abdominal segments 2-3 directed towards the mid-line.

The differences in the morphology of the larvae of Karwar specimen from those described by Kurata (1969) as of *S. aspera* suggest that either Kurata wrongly identified his adult material or that the present material may belong to a hitherto undescribed species. Taxonomy of this species thus needs to be carefully studied in detail, especially in the light of larval evidence, because there is confusion in the identity of *S. aspera* at present and there are many synonyms. Moreover, the revision of the taxonomy of all the 3 species of the genus based on the laboratory reared specimens would be most welcome.

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*Kakati and Sankolli 1975a, unfortunately have overlooked the paper published by B. F. Chhapgar in the Journal of the Bombay Natural History Society, volume 58, no. 2, of August 1961, on pages 529-531. Chhapgar recorded the spider, crab *Acanthonyx limbatus* A. Milne-Edwards [—*Dehaanius limbatus* (A. Milne—Edwards)] from Port Okha in the above cited reference. Therefore, the priority of recording, *Dehaanius limbatus* (A Milne-Edwards) goes to Chhapgar.